

**BELLCOMM, INC.**

955 L'ENFANT PLAZA NORTH, S.W.

WASHINGTON, D. C. 20024

**SUBJECT:** Trip Report: Twenty-First AAP  
Flight Operations Plan Meeting,  
MSC, October 18, 1968 - Case 610

**DATE:** October 29, 1968

**FROM:** B. H. Crane

MEMORANDUM FOR FILE

At the twenty-first AAP Flight Operations Plan (FOP) Meeting, flight crew comments were given on retention of the SM return battery pack and on the feasibility of night launch or landing operations in AAP-1. Presentations were also given on some of the factors that constrain launch intervals for AAP missions. All system operating constraints currently identified for AAP modules were reviewed. Following are brief summaries of these topics and other items discussed at the meeting, which was held in Houston on October 18.

1. SM Return Battery Pack

Flight crew comments on the return battery pack support the conclusion that it should be retained in the baseline until the reliability and failure modes of the Allis-Chalmers fuel cells are better known. If there is any statistical dependence among failures, continuing the mission until two fuel cells had failed would be unacceptable without the return battery pack. In addition, there should be no single-point failures in the fuel cell system if the SM batteries are deleted.

To evaluate the question of deleting the SM batteries in more detail, a power profile is needed for CM/SM separation from the cluster and SPS deorbit. The FOP chairman requested that flight planning of these phases be accelerated and the plan submitted for a consumables analysis. The effect of an RCS deorbit is also to be considered.

2. Night Launch or Landing for AAP-1

The implications of a night launch or landing for AAP-1 are being studied in an FOP action item as alternatives to decreasing the mission duration or adding Pacific recovery zones. Astronaut Paul Weitz stated that the mission should not be planned with launch, deorbit, splashdown, or recovery at night unless essential mission objectives would otherwise be compromised. He indicated that a nominal deorbit in darkness would be acceptable, however, as long as an alternate landing area is also available permitting a backup deorbit with a visible horizon. A manual deorbit requires a lighted horizon to maintain attitude during the burn in case both primary and secondary guidance systems fail.

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ABSTRACT

Current thinking on the SM battery pack is to retain it in the AAP baseline until both the reliability of the AC fuel cells and power requirements for CM separation from the cluster are understood in greater detail. Launch and recovery alternatives for AAP-1 are still under study, but a planned landing in darkness is reported to be completely unacceptable from the crew's viewpoint. Factors considered toward determining minimum and maximum intervals between AAP launches include: criteria for committing the second launch of dual missions, time required to modify software and perform the required testing between missions, and days on which launch opportunities occur in daylight. The Flight Operations Plan meeting is also documenting preliminary system operating constraints for AAP modules. In this connection, a committee has been formed to discuss the spectrum of constraints that must eventually be documented for AAP.

A planned landing in darkness, on the other hand, is considered to be completely unacceptable. Although a nominal splashdown is probably not seriously hampered by darkness, the possibility that the crew may have to leave the command module is made more dangerous by nighttime conditions. The feasibility of crew egress from the capsule and execution of recovery operations have also not been demonstrated at night. A similar objection applies to launch aborts at night.

It was pointed out that mission constraints on darkness for these operations should be stated in terms of time until daylight or time until darkness. Additional considerations on night launch, landing, and recovery, as well as possibilities for alternate recovery zones, will be discussed in the full report by the Landing and Recovery Division (LRD) at a future FOP meeting.

### 3. Launch Intervals for AAP

A report by the Flight Control Division (FCD) indicated that the earliest opportunity to launch AAP-1 would occur about 23-1/2 hours after the launch of AAP-2. Selection of this launch opportunity is based on ground monitoring of the passivation sequence for AAP-2, deployment of the discone antennas, and other events needed to commit AAP-1 to launch. An interval of about four days is needed between the launch of AAP-3 and AAP-4 to permit OWS activation by the AAP-3 crew, according to this study.

The Flight Support Division (FSD) gave 55 days after splashdown of AAP-3A as a minimum time needed to reconfigure the Mission Control Center - Houston (MCC-H) and perform the requisite tests to prepare for AAP-3/4, assuming changes in major software. This figure could be reduced to 21 days if two control rooms and supporting facilities were available. Additional data on these times and the assumptions made are available from the FOP minutes.

The Mission Planning and Analysis Division (MPAD) presented sample intervals in which daylight launches could be made for the five missions. Assuming a northerly launch of the OWS at noon into a 35° inclination orbit and a southerly launch of all manned missions, the following intervals provide daylight, arbitrarily chosen as 6 am to 6 pm: days 1 - 22 for AAP-1/2, days 92 - 116 for AAP-3A, and days 186 - 210 for AAP-3/4. It was noted that similar lighting conditions repeat about every 48 days. Additional data contained in this presentation will be covered in the FOP minutes.

### 4. System Operating Constraints

Preliminary system operating constraints are now available for the AM, CM/SM, LM-A, and ATM. Each constraint was reviewed individually at this meeting. MSFC plans to provide similar constraints for the MDA and OWS after some current

re-design problems have been solved. Additions or modifications for all modules are to be reported at each FOP meeting on a regular basis.

To provide a more definite framework within which to develop and analyze these constraints, the FOP chairman is appointing a committee to categorize the kinds of constraints that must eventually be documented and, possibly, to recommend new terminology. A chairman is to be appointed by MPAD with representatives from AAPO, FCD, FCOD, and MSFC. A report is planned for the next AAP FOP meeting.

5. Status of Other Action Items

Results of the September 26 Baseline Configuration Meeting at MSFC were presented at this FOP meeting. In addition, ATM antenna patterns are now available for simultaneous transmission of telemetry from both antennas; a separate series of meetings is being held on this subject. Other topics that are still under study include lighting requirements for the unmanned LM/ATM rendezvous, recommended time for handover from automatic LM/ATM rendezvous to remote docking control, and the effect on the WACS of propulsive venting from the CM. These reports are expected at the twenty-second AAP FOP meeting, which is planned for January 10, 1969.



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